China's Leadership in the World ICT Industry: A Successful Story of Its "Attracting-In" and "Walking-Out" Strategy for the Development of High-Tech industries?[1]

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Introduction

One of the most striking phenomena after China's three decades of opening up is that the country's huge volume of exports is increasingly in the high-tech field, and a number of large domestic enterprises are approaching multinational stages, operating worldwide and acquiring firms in advanced economies. It seems that China is now making a leap from a simple manufacturing centre to an advanced technology "super-state."[2] How did China achieve this success? Is the growth really as impressive as it appears? Has China become more competitive and taken a lead in some high-tech industries? Previous literature has documented the motivations, regulatory changes and development process of China's "opening up" in promoting expansion of trade and outward investment.[3] What is still little known is how the "attracting-in" (*Yinjinlai*) and "walking-out" (*Zouchuqu*) strategies have been used to develop China's competitiveness and to catch up with leading countries in some high-tech sectors. This paper attempts to analyze how these policies have been applied to one of China's priority development

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[1] The "attracting-in" strategy refers to China's selective policy toward trade, inward FDI and technology importation. The "walking-out" strategy means export and outward FDI promotion policies, which aims to achieve a gradual industrial growth in the international market. These strategies were first officially announced by President Jiang in 1997 (see section 2).

[2] Ernest H. Preeg, *The Emerging Chinese Advanced Technology Super-state* (Washington, DC: Manufacturers Alliance and Hudson Institute, 2005), pp. 1-5.

[3] For recent reviews see Eunsuk Hong and Laixiang Sun, "Dynamics of Internationalization and Outward Investment: Chinese Corporations' Strategies," *China Quarterly*, vol. 187 (2006), pp. 610-634; and Lee Branstetter and Nicholas Lardy, "China's Embrace of Globalization," *NBER working paper*, no. 12373 (2006).

industries, the Information and Communication Technology (ICT) sector, and to determine how successful they have been in promoting this industry. The paper begins by identifying the unique characteristics of these strategies, which were crucial to understanding the state aims and efforts to promote the growth and global expansion of the industry. It then investigates whether the strategies have improved Chinese enterprises' competitiveness and spurred on such vigorous growth and expansion. Section 4 discusses the challenges the policies face, given the increasing dynamism of global competition. Section 5 concludes the analysis of this paper.

China's "attracting-in" and "walking-out" strategies in the ICT industry

In the late 1970s, China put an end to the turmoil of the Cultural Revolution and ended confrontation with the West_to look outward. The dynamism of the neighbouring East Asian "Tigers" (EATs) undoubtedly made Chinese leaders take a second look at a market-oriented and export-led development approach. President Jiang Zemin reiterated that "attracting-in" and "walking-out" were the two crucial components of China's "opening-up" policy which complemented each other.[4] These strategies have worked in three unique ways, shaping the development of the ICT industry.

"Attracting-in" and "walking-out" together formed the "opening-up" economic strategy to initiate the industry

Jiang Zemin explained that China could not encourage foreign inputs to its economy ("attracting-in") without domestic outputs that simultaneously flowed out to the rest of the world ("walking-out").[5] Although a small number of outward investments were made for political motives, the early implementation of the policy was largely about "attracting-in."[6] This was mainly determined by China's economic and political circumstances at the time. In the early 1980s, China faced major concurrent crises: energy shortages, short supply of agricultural goods and rising unemployment. To prevent the outbreak of crises, a structural reorientation reform policy was initiated in the hope of shifting resource allocation away from energy-intensive, heavy and military industries to labour-intensive light industries

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[4] Jiang Zemin, "Implementing 'Attracting-in' and 'Walking-out' Combined 'Opening-up' Strategies 1997," *Selected Works of Jiang Zemin* (Beijing: People's Publisher 2006), pp. 91-94.

[5] Jiang Zemin, "Lun shijie dianzixinxi chanye fazhande xintedian yu woguo dianzixinxi chanye de fazhan zhanlue wenti" [Discussion on the New Development Features of the World Electronics Industry and the Development Strategy of Our Country's Information Industry] in China Electronics News Agency, ed., *Zenxing Dianzye Benxiang Xinxihua* [*Reviving the Electronics Industry and Rapidly Informationalization*] (Beijing: dianzigongye chubanshe 1993), pp. 3-13.

[6] For example, outward investment in Third World countries was used in exchange for support of China's UN permanent membership, isolation of Taiwan and enhanced rights with other socialist countries (excluding the USSR).

and agriculture. The reform took place at a time when market institutions were virtually absent. Macroeconomic imbalances frequently emerged and led to serious open inflation throughout the 1980s and early 1990s. Austerity policies were initially pushed forward to restore the "plan," cutting down the state budgetary investment as well as restraining rising domestic consumption and credit growth.[7]

As the minister of the electronics industry at the time, Jiang argued that a relatively liberalized regime and financial incentives were necessary to attract FDI (foreign direct investment) if the domestic economy was unable to provide kick-start investment for the technology and capital-intensive electronics industry. The selective introduction of FDI to develop this sector was particularly helpful to alter China's industrial structure towards export-oriented labour-intensive industries. The country could reveal its "comparative advantage" in some sectors and accumulate foreign currency for technology imports. Based on the experience of the East Asian "tigers" that had specialized in electronics, Jiang proposed to step into the world electronics industry through assembling and contract manufacturing activities for multinational corporations (MNCs).[8] In the 1980s, the government began to introduce "special economic zones" in order to provide market institutions and preferential policies outside the plan system to attract and support FDI activities. Since Deng pushed forward a renewed reform agenda in 1992, special provisions and more liberal policies were made much more widely available for FDI in China.[9] The main motivations of the policy were to use FDI "*to lay the foundation [of the ICT industry,] bringing up the [technological, production and management] level*" and to gain financing for production and marketing channels to the advanced economies.[10] The development logic of Chinese leaders was that a well-guided "attracting-in" strategy would stimulate the growth of indigenous production capability and in turn achieve the first step of Chinese products "walking-out": export growth.

The "attracting-in" and "walking-out" policies are an integral part of China's industrial strategy, used to foster the competitiveness of Chinese multinationals

In contrast to its overall market and trade liberalization reforms, China intended to pursue an EAT-style industrial strategy, centred on the development of high-tech industries. The ultimate objectives of such a strategy were: regaining China's historical status, ensuring economic and technological

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[7] Barry Naughton, *Growing out of the Plan* (Cambridge: Cambridge University Press 1995).

[8] Jiang, *Reviving the Electronics Industry*, pp. 10.

[9] Bransetter and Lardy, "China's Embrace of Globalization," 2006.

[10] Wang Haibo, *the Industrial History of the New China 1979-2000* (Beijing: Economic Management Publisher, 2001).

autonomy and attaining the frontier of international competitiveness.[11] The strategy has been selective, nationalistic and interventionist, implying that the early "attracting-in" was a mixture of import substitution and export promotion strategies. In the ICT sector, Jiang advocated strict import substitution of low- and medium-tech products at earlier development stages, while selectively introducing products which had spill-over effects and were difficult for domestic enterprises to produce.[12]

The ministry of the electronics industry began to announce targeted areas in the ministerial "five-year-plan" (e.g., computers, integrated circuits, telecommunication equipment, software, etc.). However, China's self-financed "dual-use" science and technology programmes (e.g., the "863," "909" and "Torch") had limited success, producing neither substantial commercial spin-offs nor improving general capabilities to close the gap with advanced countries.[13] Chinese leaders decided to further liberalize the domestic market in the hope of exchanging market access for newer and desirable technologies (*shichang huanjishu*). To direct FDI into selected sectors, a regularly revised foreign trade and investment guideline system was established in 1995. Restricted and prohibited areas and trade barriers have been gradually reduced to be consistent with the protocol of China's accession to the World Trade Organization (WTO). After experiencing difficulties in obtaining advanced technologies in some targeted areas such as semiconductors, the government finally permitted wholly foreign-owned enterprises (WFOEs). It was hoped that targeted products could then be manufactured in China.

The ultimate aims of a more liberal "attracting-in" policy were still to foster the international competitiveness of domestic enterprises to move from the first step of "walking-out," exports, to the second step of outward investment. In the first stage, large vertically integrated ICT state-owned enterprises/state-controlled enterprises (SOE/SCEs) associated with the Japanese/Korean model were created to absorb "attracted" technologies and to swiftly turn them into a large-scale production to achieve cost-comparative advantages over international counterparts.[14] "Attracted" FDI was also used to foster a greater degree of competition to improve these enterprises' efficiency. After seeing the limitations of the Japanese/Korean conglomerate models during the East Asian financial crisis, the government has placed

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[11] Deng Xiaoping, "China Must Take Its Place in the Field of High-Technology, 1988, 24th October," *Selected Works of Deng Xiaoping* (People's Daily, Electronics Version, 1994). Barry Naughton and Adam Segal, "China in search of a workable model: technology development in the new millennium," in William W. Keller and Richard J. Samuels, eds., *Crisis and Innovation in Asian Technology* (Cambridge: Cambridge University Press, 2003), pp. 160-86.

[12] Jiang, *Reviving the Electronics Industry*, p. 10.

[13] Richard P. Suttmeier and Yao Xiangkui, "China's Post-WTO Technology Policy Standards, Software, and the Changing Nature of Techno-Nationalism," *The National Bureau of Asian Research Paper*, no. 7 (May 2004), available at <http://www.nbr.org/publications/issue.aspx?ID=126>.

[14] The strategy also refers to the national champion or the big business strategy.vv

some emphasis on small- and medium-sized enterprises (SMEs). It is expected a group of ICT "small giants" (*xiaojuren*) will grow in targeted niche markets to reduce the structural problems and to complete the domestic supply chain in order to support existing large enterprises.[15]

In the second "walking-out" stage, China began to encourage large "capable" indigenous enterprises to engage in outward investment. In 2002, Jiang reiterated the importance of combining state-led outward investment with a trade expansion strategy to achieve national competitiveness.[16] On one hand, China's motivations were to enhance "attracting-in" because outward investment would enable China to more directly access technologies that foreign investors were reluctant to bring in (e.g., through setting up R&D centres abroad or taking over foreign firms), to explore human and financial resources and to obtain the material and energy resources that the country is lacking from other developing countries; on the other, the second step of enterprise "walking-out" was to enhance the first step by quickly improving the technological contents of export and building up brand image, overseas distributing, services and marketing channels. To encourage domestic enterprises to go international, the government has relaxed its controls on restricted sectors, simplified approval procedures, provided free information services, abolished foreign exchange requirements and provided easily obtained bank loans.

The "attracting-in" and "walking-out" strategies have remained focused on state ownership due to the transitional nature of the Chinese economy

The path of China's reform has featured gradual and partial changes, dualistic systems and decentralization. The reform efforts have affected the types of enterprises participating in "walking-out." In the early 1980s, SOEs were given sufficient autonomy to expand production beyond the plan. A "dual" ownership structure was created to allow non-state enterprises to exist as buyers in support of the "outside plan" market channel for SOEs and as sellers to incite competition. They were permitted to expand but kept to a small scale to take over labour-intensive low-tech activities and to absorb surplus urban labour. Although China has not gone through a large-scale privatization of state assets, most traditional command-oriented SOEs are being chipped away at. They have been gradually converted into "modern marketed-oriented firms" (e.g., joint stock, JSC and limited liability

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[15] Lutao Ning, "Economic Liberalisation for High-Tech Industry Development? Lessons from China's Response in Developing the ICT Manufacturing Sector Compared with the Strategies of Korea and Taiwan," *Journal of Development Studies*, vol. 43, no. 3 (2007), pp. 562–87.

[16] Jiang Zemin, "Quanmian Jianshe Xiaokang Shehui, Kaichuang Zhongguo Shehuizhuyi Xinjumian" [Build a Well-Off Society in an All-Round Way and Create a New Situation in Building Socialism with Chinese Characteristics] *Jiang's Report at the 16th Party Congress*, *People's Daily*, 8 November 2002, A1.

companies, LLC) with diversified financial resources and an "autonomous" Western style of management in the late 1990s.[17]

However, Chinese leaders had strong political considerations, which stressed the primary controlling ownership of the state in the strategic "pillar" and high-tech industries for the purpose of consolidating the socialist system, ensuring national security, supplying public goods, adjusting economic structure and leading economic growth.[18] The "dual-use" (military and civilian) ICT industry has been accordingly retained with a dominant ratio of state ownership in the domestic-funded enterprises (DFEs). Many large enterprises in many ways had "lineage" with SOEs, exhibiting close relations with the state at all levels.[19] Table 1 shows a parallel shift of total industrial assets from traditional SOEs to JSCs. Total ICT SCEs still accounted for an average of 73 percent of the domestic assets in the industry during the 2003-2005 period.

As part of the enterprise reform, local governments were decentralized to sell off or merge smaller and less profitable SOEs with others ("grasping the large and leaving the small"). The total assets of the private ICT sector grew no more than 0.5 percent of the industry's total and 0.8 percent of the domestic total before 1997. Until after China's WTO accession in 2001, the government shifted the policy focus to promote domestic Chinese-owned firms in response to progressively more fierce foreign competition. Private sectors have increased dramatically, accounting for 5 percent of the industry's total assets and about 15 percent of domestic assets in 2005. Considered together with private firms' small-scale industrial output, export and technological capability among DFEs and lack of political support, the "walking-out" strategy was primarily designed for SOEs and SCEs with diversified ownership.[20] The motivations of these Chinese "pillar" enterprises might appear very similar to the theoretical and EAT models, but their choice of investment decisions has remained highly state-influenced throughout the whole "walking-out" process.[21]

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[17] Wang, *The Industrial History*, 2001.

[18] *Decision of China's Central Communist Party Regarding SOE Reform and Related Crucial Issues on 22nd Sept* (Beijing: Xinhua News Agency, 1999).

[19] For example, China's largest computer producer, Lenovo, was created within the Institute of Computer, Chinese Academy of Science in 1984. It was regarded as "the son" of the ministry of the electronics industry, enjoying various preferential policies.

[20] Private firms' share in China's total ICT output never reached more than 1 percent before 2000 and only accounted for 4.9 percent in 2005. Their share of sales in the domestic market rose dramatically to 7.5 percent from almost no share in the early 1990s but still remain small compared to other DFEs (see figures 2 and 3).

[21] For example, see John Dunning's eclectic ownership, location and internalization paradigm of international production. For an application, see Kevin G. Cai, "Outward Foreign Direct Investment: A Novel Dimension of China's Integration into the Regional and Global Economy," *The China Quarterly*, volume 160 (1999), pp. 856-880.

Table 1
Number of Firms and Percentage of the Total Assets of the ICT Industry by Types of Enterprise

	1997	1999	2001	2003	2005
Foreign funded					
Number of firms	753	735	865	3,987	6,480
% total assets of ICT industry	34	36	37	59	68
Domestic funded					
State owned					
Number of firms	1,225	1,001	789	860	659
% of total assets of ICT industry	46	37	30	13	7
% of domestic assets	70	58	48	31	23
Collective					
Number of firms	954	618	474	857	617
% of total assets of ICT industry	8	8	10	3	2
% of domestic assets	13	13	15	6	5
Joint stock					
Number of firms	156	311	689	1,725	2,555
% of total assets of ICT industry	10	15.6	18.9	21.1	17.6
% of domestic assets	15	24	30	51	55
Private					
Number of firms	30	46	117	2,607	5,180
% of total assets of ICT industry	0.4	1	2	4	5
% of domestic assets	1	2	4	9	15
Total SCEs in the industry*					
Number of firms	~	~	~	1,546	1,435
% of total assets of ICT industry	~	~	~	33	22
% of total domestic assets	~	~	~	79	70
Total of the industry					
Number of firms	2,914	2,839	3,062	10,596	16,007
Total assets *(Billion Yuan)*	3,828	5,220	7,813	14,342	21,305

Source: Yearbook of China's Information Industry (YCII) 1997-2005.
**Note:* SCEs refer to those enterprises in which the state has the largest share of ownership and include state-controlled foreign joint ventures.

The outcome of "attracting-in" and "walking-out" in the ICT sector

The question remains whether China's strategies, as leaders expected, have "attracted" desirable technologies to improve domestic firms' technological capability, and assisted them to "walk out" of the country with true international competitiveness.

China's emergence in the world ICT industry

The implementation of a more liberal "attracting-in" policy led to a sharp rise in FDI. Although exhibiting a decline during the Asian financial crisis, the figure remained high and reached US$1.44 billion when China joined the WTO in 2000 and a record of $8.6 billion in 2004 (see table 2). Chinese officials estimated that the total value of FDI was more than twice that of government investment in the industry (180 billion Yuan) from 1990 to 2002. By 2005, the accumulated value of FDI reached more than $100 billion; today, 90 percent of 500 top IT enterprises listed on *Fortune* have investments in China.[22] Measured by total assets, foreign invested enterprises (FIE) took a 34 percent share of the industry in 1997; this rose to a 68 percent share by 2005 (see table 1).

Table 2
China's Actual Utilized ICT Foreign Investment, 1995-2004
(Million dollars at 8.2 Yuan exchange rate)

	Actual utilized FDI
1995	345
1997	931
1999	447
2001	1,343
2003*	4,000
2004*	8,637

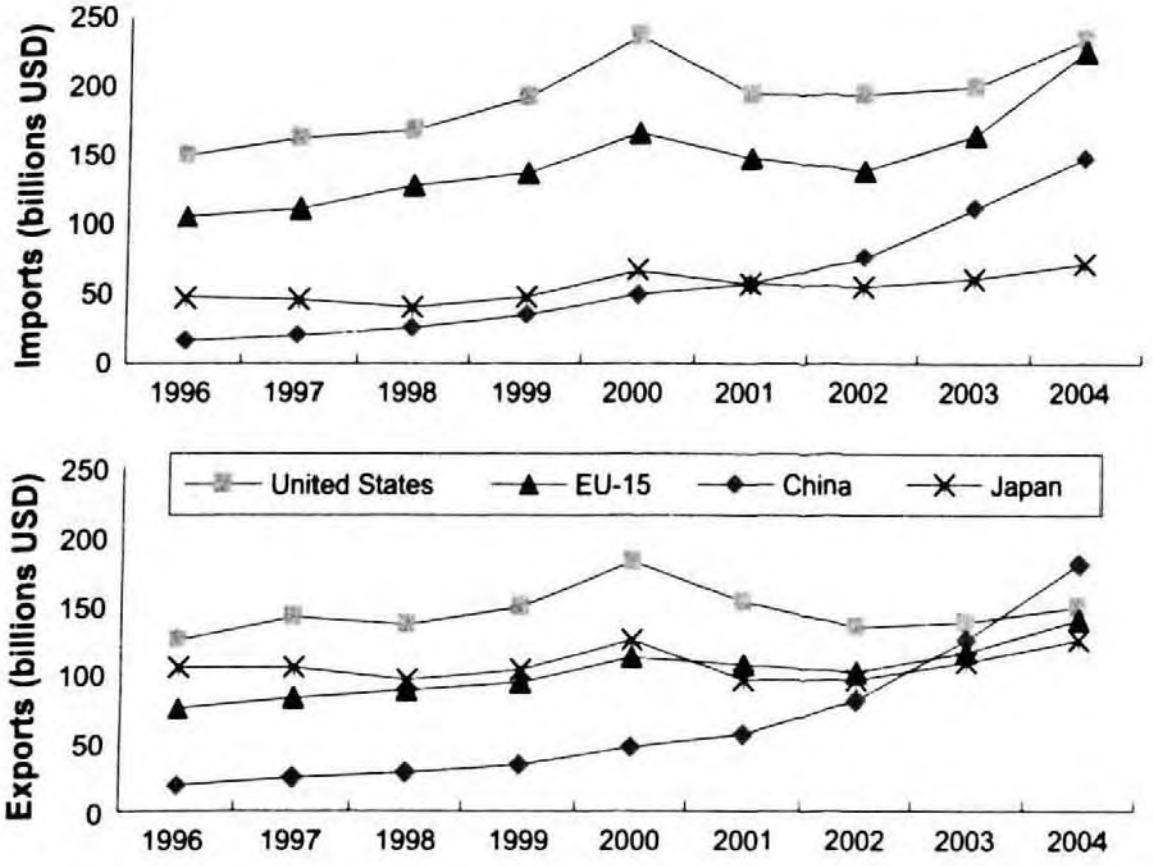
Source: YCII,1986-2006.

* Available figures announced by the ICT ministerial officials. Figures before 2001 may only include the electronics manufacturing industry.

Along with the massive inflow of "attracted" FDI has come the incredible growth of industrial output and the success of the first step of Chinese-made exports "walking-out." During the 2003-2005 period, China remained the world's third-largest ICT producer, with an increase from $14.7 to $20.1 billion in industrial output, representing 13.1 and 15.1 percent, respectively, of the world's total. China has also been closing the gap of its world output

[22] MII, *Yearbook of China's Information Industry* (Beijing: dianzigongye chubanshe, 2004).

Figure 1
Imports and Exports of ICT Products by Major Countries 1996-2004
(Billions of USD)



Note: Data for the EU exclude intra-EU trade.
Source: OECD 2006, ITS database

share, with Japan the world's second-largest ICT producer, from 2.1 to 0.6 percent and the US the first, from 12.4 to 5.5 percent. In terms of exports, China successfully overtook the positions of Japan and the EU in 2003, and took the lead over the US ($149 billion) in 2004 to become the world's biggest ICT exporter ($180 billion) (see figure 1).

The qualitative restructuring of Chinese exports equally demonstrates China's growing competitiveness in the ICT sector. The more liberal "attracting-in" strategy has been rewarded with an increase in access to foreign technologies. There were over 750 foreign-funded R&D centres by 2006, the majority of which are in the ICT industry.[23] The composition of industrial output and exports has shifted from simple low-value-added consumer

[23] Zedtwitz's research shows that 52 percent of a sample of 466 foreign R&D centres based in China were ICT-related by 2004. Maximilian Von Zedtwitz, *Connecting Science to Innovation: Managing R&D on a Global Scale* (London: Edward Elgar, 2007).

electronics to complicated high-end production. Computers and related sectors continue to hold the largest ICT output share (average 30 percent) since 2002 while all others have shrunk. They also constituted the majority of China's ICT exports, rising sharply from 29 percent in 1996 to 46 percent in 2004.[24] Of all the computers sold worldwide, 23.6 percent are now made in China. The country also exported 27.5 million laptops (60.9 percent of China's total computer export), surpassing Taiwan as the world's largest producer in 2004. Similarly, China has captured the largest share of the global TV (55 percent) and mobile phone market (35.1 percent) in 2004.[25]

Finally, a few Chinese MNCs seem to be rising in the world market and "walking-out" of the country to set up business abroad. The MII announced that 25 of China's top 100 firms had set up foreign subsidiaries by 2004 and there are already 20 Chinese-invested R&D centres in advanced countries. Many Chinese enterprises were encouraged by the state to take over foreign firms. For example, China's premier PC company, Lenovo, acquired IBM's PC business for $1.75 billion in 2005. TCL purchased Germany-based Schneider Electronics in 2002, and then merged with France-based Thomson to take over its TV business.

All these impressive achievements seem to imply that the "attracting-in" strategy has successfully introduced much sought-after foreign capital and technologies, and as Chinese officials expected has laid a "foundation" for the industry to expand globally. Given the assumption that China has taken over some consumer electronics markets, ministerial officials have become more convinced that the EAT-style industrial policies will enable the industry to leapfrog to a "higher stage of development" and achieve a global technological leadership position before 2020.[26] A close inspection of the industry reveals a very different picture.

The Illusion of China's ICT "walking-out"

Trade and Production Structure of the "Walking-Out"

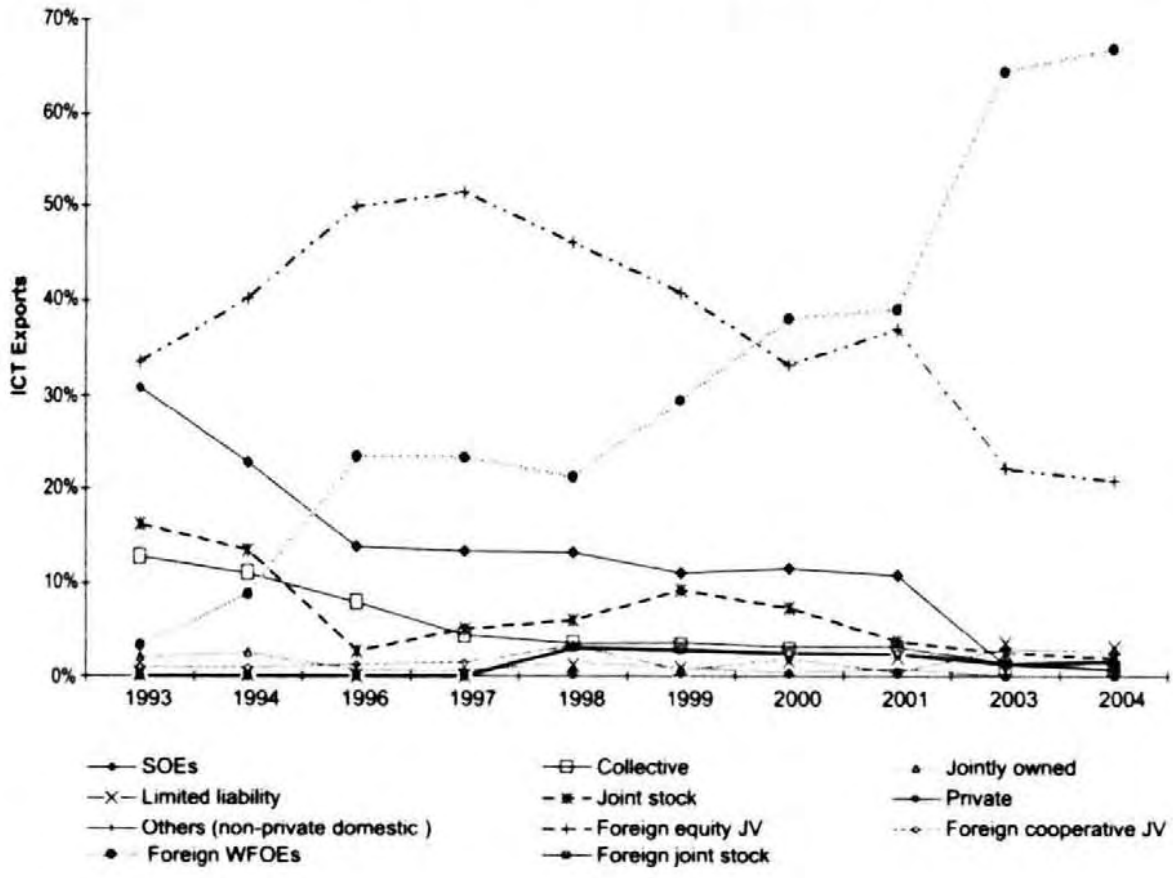
China's ICT trade and production structure includes a large proportion of industrial growth which was not generated by Chinese enterprises but overwhelmingly by FIEs. As figure 2 indicates, the various forms of FIEs have, since 1994, surpassed all domestic enterprises, soaring to a 92 percent share of the total exports in 2004. WFOEs, instead of JVs, have become the main drive of China's ICT trade, especially after China's WTO entry. WFOEs were responsible for nearly 66.8 percent and 82 percent of the total exports and imports respectively in 2004. FIEs' net exports reached $29.6 billion in 2004

[24] Statistics compiled by the author from YCII, 2006.

[25] YCII, 2005.

[26] Refers to objectives in "China's ICT Fifth Five-Year-Plan and 2020 Mid- and Long-Term Plan" announced by the MII in 2006.

Figure 2
China's ICT Exports by Types of Enterprises, 1993-2004



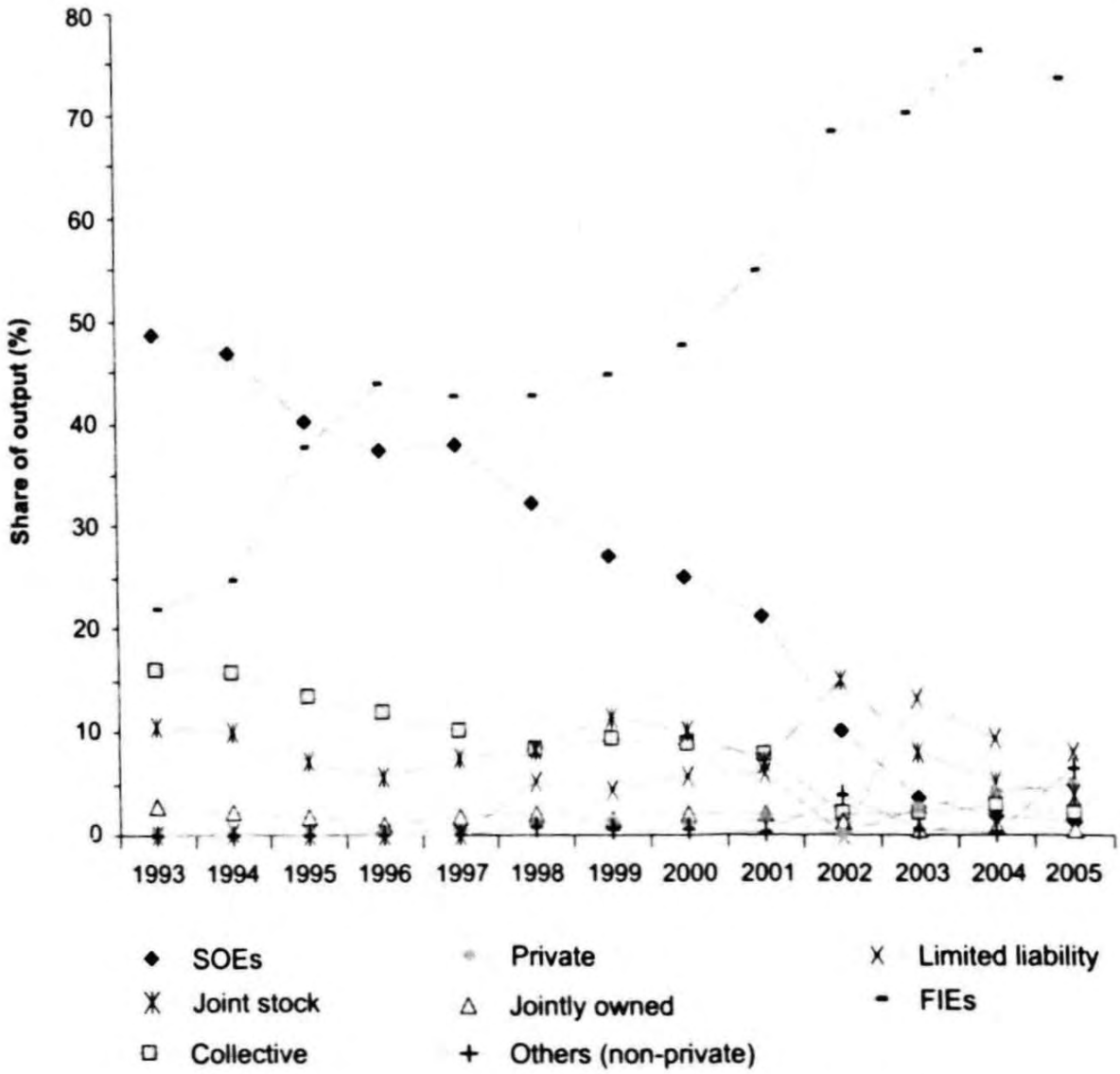
Sources: YCII, 1993-2005.
Notes: Data for comparative analysis in 1995 and 2002 is unavailable; the figure only shows enterprises with an output share more than 1 of the total output of the year.

and only accounted for 16.7 percent of their export value. By contrast, DFEs ran a trade deficit. They contributed 16 percent in 2003 and 14 percent of the total exports in 2004 while importing 23 percent and 18 percent of the total imports, respectively.[27] FIEs also produced the largest share of industrial output in the 1990s (see figure 3). Their output share soared to 44 percent in 1996 and surpassed the total of all domestic firms in 2001. These figures show the dominant position of enterprises under full foreign control in both China's ICT trade and production.

With superior technological and management capabilities, FIEs undoubtedly have put more intense pressure on DFEs than policymakers intended. They have become more dominant in China's domestic market. The conversion of traditional SOEs has led to a steady increase in the share

[27] Statistics compiled by the author from YCII (various years).

Figure 3
Share of Output by Types of ICT Enterprises 1993-2005



Sources: YCII, 1993-2005
Note: Data for comparative analysis in 1995 and 2002 is unavailable

of domestic sales held by JSC, LLC and private enterprises from less than 20 percent in 1993 to 34 percent in 2004. However, during the same period, FIEs increased their share from about 20 to 53 percent in 2003 and made up 57 percent of the total domestic sales in 2004. Profit over sales ratio of the whole industry declined from 6.0 percent in 2003 to 3.1 percent in 2004 (table 3). FIEs' lower profit over sales ratio and larger percentage of exports imply that their foreign trade activities are mainly taking place within MNCs themselves.

The illusion of "walking-out" is further confirmed by the firm level data. China's MNCs remain small in size. The OECD ICT report shows that none

Table 3
Domestic Market Share, Profit and Value-added Over Sales by Types of Enterprise, 2001-2004 (%)

	Share of domestic market	All collectives	Joint stock collective owned	Joint stock	Private	Foreign funded
Share of domestic market						
2001	25.8	16.5	2.5	14.8	2.1	38.1
2002	13.6	4.0	2.6	22.3	7.4	50.1
2003	9.7	5.4	1.4	23.9	5.8	53.3
2004	8.5	5.0	1.9	20.0	7.1	57.0
Profit/total sales						
2001	3.3	6.1	7.5	6.0	7.5	5.8
2002	2.1	4.8	5.3	5.8	6.7	4.1
2003	2.5	4.2	8.8	5.8	6.0	3.6
2004	-1.6	3.3	5.7	2.0	5.1	4.2
Value-added/total sales						
2001	20.2	17.1	37.1	24.9	28.7	21.6
2002	~	10.3	9.8	17.8	6.6	15.2
2003	20.0	20.0	19.4	20.1	20.0	20.2
2004	21.8	18.6	19.6	25.5	26.8	20.8

Source: YCII, 1998-2005.

of China's MNCs has so far been listed in the world top 250 firm classification.[28] China's largest PC maker Lenovo quadrupled its revenue to $13 billion after taking over IBM's PC business in 2006, but is still one-ninth the size of IBM ($91 billion) and one-fifth the size of Dell ($55 billion). Furthermore, contrary to the intended outcome of the "walking-out" strategy, China's top ICT exporters are not Chinese MNCs at all. In 2005, China's largest ICT exporter was Hongfujin Precision, a wholly owned subsidiary of Taiwanese Foxconn for the third successive year. It had exports of $14.5 billion, seven times more than Huawai ($2.0 billion). This is followed by Fengda Shanghai Computer (wholly owned by Taiwan Quanta) at $11.5 billion, ASUSTeK Computer at $6.2 billion (wholly owned by ASUS), Motorola at $6.4 billion and Samsung at $3.5 billion.[29]

[28] OECD, *IT Outlook* (Paris, OECD, 2006). Although China Mobile was ranked 43rd in 2004, it primarily serves the domestic market and has not yet expanded internationally.

[29] Data gathered from the MOC 2006, available online at <http://www.mofcom.gov.cn/>, last accessed 8 January 2009.

Technological structure of the "walking-out"

A closer look at China's ICT technological structure of trade indicates that the ICT exports still encompass a large share of labour-intensive manufacturing activities. Throughout the 1997-2004 period, China's exports comprised about 70 percent FDI-led import processing activities (table 4).[30] These figures suggest that local value-added in relation to the export process is very low, averaging 21.5 percent added-value over sales (table 3). Most value-added content of China's ICT export is created elsewhere.

Table 4
China's ICT Export Activities, Selected Years (%)

	1998	2000	2002	2004
Processing with imported materials	66.9	70.0	72.6	74.2
Processing with customer's materials	22.7	20.0	17.2	14.8
Ordinary trade[1]	7.6	8.3	7.7	7.7
Others	2.9	1.9	2.5	3.3

[1] Exports made by enterprises with foreign trading rights.
Source: YCII, 1999-2005.

The industry relied heavily on foreign imports of key components and advanced equipment for production. Component imports have noticeably increased from less than 50 percent before 2000 to 65 percent of the total ICT imports in 2004.[31] Apart from meeting domestic demand, many of these high value-added parts went essentially to those sectors that China took the lead in, in terms of export and production. For example, China ran trade deficits of $50 billion in integrated circuits, $7 billion in semiconductors for producing mobiles and computers, as well as a small portion of tubes for TV production.[32] China's ICT net exports were only $31 billion in 2004 (figure 1). Principal export products are either mature, standardized, non-differentiated and price-sensitive products or parts for finished goods. Firms producing these goods are competing on a very low profit margin where costs of production, especially labour costs, are crucial.[33]

All the figures above imply that China's strategies are falling short of their goals: to improve the competitiveness of domestic firms. Instead of large "backbone" enterprises, FIEs have primarily led the first step of "walking-out." Virtually no domestic enterprise is capable of controlling China's own export

[30] Except for the year 2001, which was affected by the World ICT industrial downturn.
[31] Statistics compiled by the author from YCII and OECD, *IT Outlook*, 2006.
[32] OECD, *IT Outlook*, 2006.
[33] Ning, "Economic Liberalisation?" pp. 562–87.

and production networks or developing competitive technological sources. China's ICT industry is of a low-tech nature; domestic enterprises are far behind the world's competitive frontier.

Challenges for China's "attracting-in" and "walking-out" strategies in taking a lead in the world ICT industry

The dramatic rise of the East Asian tigers has shown that great possibilities exist for fast-developing countries to establish their own high-tech industries in the latter half of the twentieth century. However, China's strategies, which built on the experiences of the EATs, have not substantially improved its competitiveness in the ICT industry, nor put it in place to catch up with leading countries. Even so, following the EATs' supplier-oriented upgrading path, China has been able to produce and export large volumes inexpensively. Like Preeg, one might think that Chinese officials were right in assuming that Chinese enterprises will soon "walk out" and progress to a position of dominance in global markets, and eventually leapfrog global leading firms.[34] Yet, the global ICT industry itself has evolved significantly.

Network controlling capability: The new dynamic meaning of ICT competition

When East Asian ICT latecomers competed in the international market, their foreign incumbents were relatively stable, focusing on manufacturing activities. EAT companies could target the same activities and gain market share by providing lower-cost substitutes. Import substitution and subsidies were a positive-sum game for maturing industries that faced technological constriction and market saturation in the developed world. Moreover, it was in the best interest of the US to strengthen EATs' economies by easing US market and technology access and by tolerating their interventionist industrial strategies; after all, they held "front-line" positions during the Cold War.[35] In the 1980s, the early electronics technologies became mature. MNCs began to seek market expansion and increase scale economies in production. Cost-driven manufacturing "redeployment" from advanced countries to EATs generated huge outsourcing demand and provided financial resources for constructing local infrastructure. Most importantly, global production networks (GPNs) were built up and led to a significant export outflow from EATs to the advanced countries.[36]

However, when China entered the world ICT industry, the core meaning of global competition had changed. With international political relaxation

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[34] Preeg, *the Emerging Chinese Advanced Technology Super-state*, pp. 1-5.

[35] Ning, "Economic Liberalization?" pp. 562-587.

[36] Mehdi Shafaeddin, *Trade Policy at the Crossroads—the Recent Experience of Developing Countries* (Hampshire: Palgrave Macmillan, 2005).

and trade barriers and transportation costs continuously falling, the world economy has entered a globalization era, which features more integrated national economies, a rapid outward shift of technological frontiers, enhanced GPNs and an explosion of global M&A.[37] Information technologies have largely enabled firms to codify and standardize highly sophisticated production, and then transfer to lower-cost plants all over the world to enjoy cost advantages.[38] Manufacturing activities based on these technologies are often at the bottom of the GPNs. They generally have a shorter life cycle, facing stagnating markets with less potential for improvement and are considered to be less value-added, less profitable and have low productivity. By the mid-1990s, firms based in developed countries significantly shifted their manufacturing activities to developing countries.[39] China took the opportunities of production relocation accelerated by MNCs' "outsourcing innovation," and integrated itself into the GPNs.[40] With a great cost-comparative advantage, Chinese firms can today enter into most manufacturing sectors easily compared to EAT firms in their catching-up decades, when both standardization and the GPNs were not readily available.

However, global leaders simultaneously began to streamline and consolidate their own operations through massive M&A and divestment, retaining only those with strategic advantages in-house whilst outsourcing all others. They have transformed into "global flagships," concentrating on a few network "controlling" tasks at a global scale.[41] These include:

- ensuring stable connectivity, coordination and support of geographically and organizationally dispersed networks and standardized activities;
- managing international supply chains as well as information and knowledge sharing systems with global subsidiaries and affiliated firms;
- focusing on R&D in order to enhance their positions as original leading innovators;

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[37] For a review see Peter Nolan, Jin Zhang and Chunhang Liu, *the Global Business Revolution and the Cascade Effect: Systems Integration in the Aerospace, Beverages and Retail Industries* (Basingstoke: Palgrave, 2007).

[38] Timothy J. Sturgeon and Richard K. Lester, "The New Global Supply-Base: New Challenges for Local Suppliers in East Asia," in Yusuf, Shahid, M. Anjum Altaf, and Kaoru Nabeshima, eds., *Global Production Networking and Technological Change in East Asia* (Washington, DC: the World Bank and Oxford University Press, 2004), pp. 35-88.

[39] UNCTAD, *World Investment Report 200—Promoting Linkages* (New York and Geneva: United Nations Press, 2001).

[40] Barry Naughton and Dieter Ernst., "China's Emerging Industrial Economy—Insights from the IT Industry," in Christopher A. McNally, ed., *China's Emergent Political Economy–Capitalism in the Dragon's Lair* (London: Routledge, 2007), pp. 93-138.

[41] The global flagship model, see Dieter Ernst, "The New Mobility of Knowledge: Digital Information Systems and Global Flagship Networks," *Economics Study Area Working Papers 56* (East-West Centre, 2003).

- battling to set the dominant product design, definition and industrial standards;
- providing high value-added products and services; and
- strengthening global marketing communication, brand development and sales networks.

By concentrating on these activities, global flagships can raise a "static" network controlling power through their capacity for system integration. They can reap profits more rapidly from innovation to increase financial competence, and to offload the fixed costs and risks involved in establishing and supporting global business structures through outsourcing to the supplier level (the "deverticalization" or "disintegration" process).[42] As evidenced by their geographical arrangement, global leaders are often based in industrialized countries with a good skill base and technological infrastructure.[43] They can develop dynamic self-reinforcing competitive advantages by constantly modernizing and rejuvenating existing technologies and processes, and innovating new products for global customers.[44]

The argument here is not that China's strategies based on EATs' experiences failed to enable domestic firms to master complex production technologies or that the firms perform poorly in manufacturing and selling ICT products. Rather, as discussed above global competition is much more intense than was the case during the catching-up decades of EATs. China's industrial policy is not related to keeping up with the dynamic development of global ICT competition, and thus has not been able to assist domestic ICT firms in taking a lead in the world.

Technological learning and upgrading

China could certainly gain some positive upgrading impacts through participation in the GPNs in the long run, such as raising the domestic knowledge base, learning to form corporate structures to facilitate improvements in innovation and quality, and building up international linkages to enable the possibility for "mobility of knowledge."[45] Nevertheless, unlike EATs, China was long viewed as a "strategic competitor" by the US and constrained from acquiring technologies in the same way as EATs.

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[42] Mike Hobday, Andrew Davies and Andrea Prencipe, "Systems Integration: a Core Capability of the Modern Corporation," *Industrial and Corporate Change*, vol. 14, no. 6 (2005) pp. 1109-1143. Sturgeon and Lester, "The New Global Supply-Base," pp. 35-88; Dieter Ernst,"Global Production Networks in East Asia's Electronics Industry and Upgrading in Malaysia," in Yusuf et al., ed., *Global Production Networking*, pp. 90-157.

[43] UNTACD report, 2001.

[44] Carlota Perez, "Technological Change and Opportunities for Development as a Moving Target," Paper presented at the High-level Round Table on Trade and Development: Directions for the Twenty-first Century, 12 February 2002, Bangkok.

[45] Ernst, "The New Mobility of Knowledge," working paper.

Additionally, China's WTO accession and Information Technology Agreement (ITA) have swept away most conventional protection and conditions on FDI extensively used by EATs to foster technology learning and imitation.[46]

Simple, aggressive policies to promote alliances with global industrial leaders may generate a larger volume of exports. However, "attracted" FDI could not help China to quickly and automatically be at the technological frontier. There is no guarantee that FDI would bring in highly desirable knowledge and technologies suitable for the long-term development of the industry. [47] Global flagships have already become dominant in controlling resource allocation, decision making, and knowledge diffusion, and rule the GPNs. When the interventionist industrial policy is phased out under the WTO rules, the installation of necessary supporting facilities and management, demand for local contents, and decisions on the flow and speed of technologies or "knowledge mobility" to a particular region will depend on the willingness of MNCs.

"Attracting-in" enabled China to integrate into the GPNs as a newly emerged lower-tier supplier, but high-volume standardized outsourced production does not allow many changes in design.[48] Moreover, as indicated in section 3, while conditions placed on FDI were phased out, increasing quantities of components and materials continued to be imported. Even when global leaders did come to China they tended to choose the WFOE entry model. The benefits Chinese enterprises can gain that aid in building competitiveness are few. This is also due to the relatively higher costs involved in upgrading infrastructure, the availability of knowledge/skills required to support the production of the new activities (including the part of the process or design that cannot yet be codified and standardized), and the risk of exposing their technologies in China. For example, Toshiba shifted all Japanese TV production to Dalian, Liaoning province in 2001, and then converted its plant to make liquid crystal projectors and digital televisions in Japan. Toshiba also moved its entire notebook production to Huangzhou Zhejiang in 2005. Its Tokyo plant is focusing on R&D and the production of prototype models.[49]

The growing number of "attracted" foreign-funded R&D centres can hardly be the main source for China to build up competitiveness. These research centres are owned, controlled and directed by foreign MNCs to primarily localize/adjust existing technologies and to develop new products for the

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[46] For example, tariffs and quotas, elimination of conditions on foreign investments, trading and distribution rights, local content requirements, trade and foreign exchange balancing requirements, import and export rights, technology transfer requirements and specific restrictions on supporting SOEs. Detailed discussion, see Ning, "Economic Liberalization?" pp. 562-587.

[47] Vandana Chandra and Shashi Kolavalli, "Technology, Adaptation, and Exports—How Some Developing Countries Got It Right," in Vandana Chandra, ed., *Technology, Adaptation, and Export* (Washington, DC: The World Bank, 2006), pp. 1-48.

[48] Sturgeon, "The New Global Supply-Base," pp. 35-88.

[49] Ning, "Economic Liberalization?" p. 580.

Asian market.[50] They may generate some spill-over effects, but these are limited to regional markets and may not be the core competitive or desirable technologies that the local industry needs for long-term development. Given the size of China's ICT industry, these effects are fairly small.

Additionally, there is not enough time for less experienced Chinese firms to innovate, as the pace of technological progress is very rapid. Purchasing foreign technologies has become the only time-saving and cost-effective option to start production sooner. This allows them to concentrate on cost reduction through efficiency innovation and scale economies. As a result, even though Chinese firms have "walked" out to set up a few R&D units overseas, they are generally small and mainly used to search for suitable technologies that can be transferred back to China to be quickly turned to production purposes.[51] This general trend shows that Chinese firms still lack the capability to engage in either product innovation or industrial product definition, although the government has begun to use China's market size to promote its own international industrial standards.[52]

Keeping up with dynamic competition

It is very hard for China to keep up with the global competitive trend, given the country's current economic capability. China's technological capabilities are still far behind those advanced ICT countries it "caught up" with. In 2003, China's R&D expenditure over added-value for both electronic telecommunication and computer office equipment was significantly lower than in other leading ICT countries (table 5). China still has a considerably

Table 5
The Ratio of R&D Expenditure to Value-added of the ICT Industry by Country

		Electronic and telecommunication equipment	Manufacture of computers and office equipment
China	2003	5.4	2.5
USA	2001	37.2	36.7
Japan	2002	20.4	90.4
Germany	2001	44.1	19.8
France	2002	57.2	15.8
UK	2002	23.4	5.9
Korea	2003	23.4	4.4

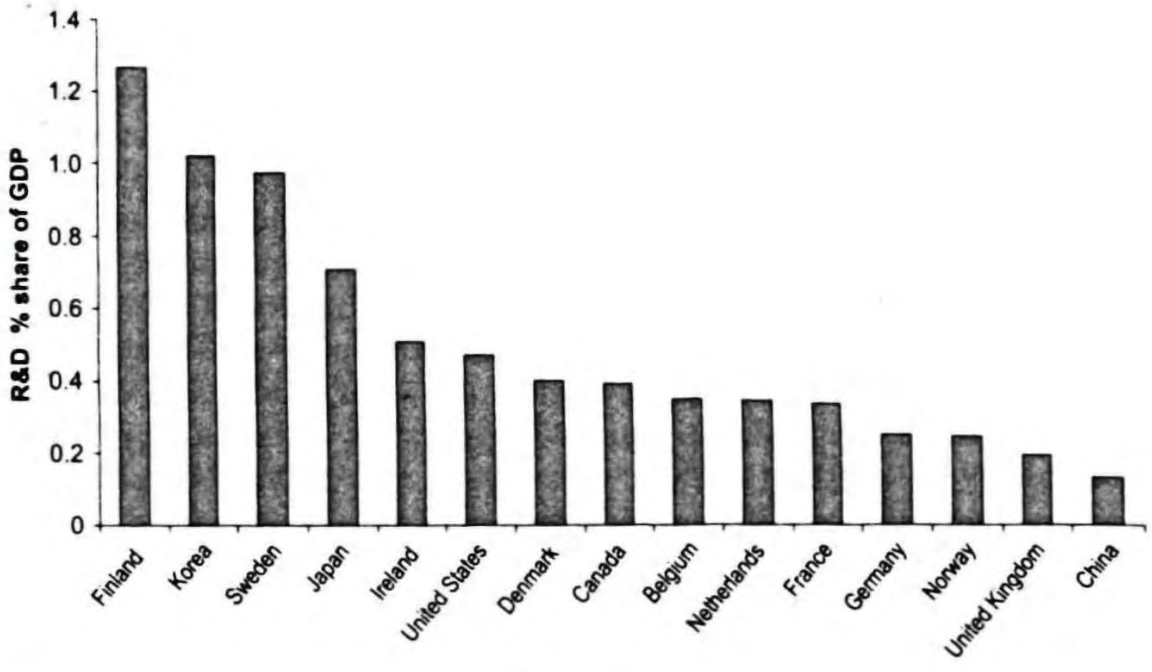
Source: China's Statistics Yearbook of High-Tech Industries 2005.

[50] F.M. Ross Armbrecht, *Siting Industrial R&D in China: Notes for Pioneers* (Arlington, VA: Industrial Research Institute, 2003).

[51] Max von Zedtwitz, "China Goes Abroad," in Samuel Passow and Magnus Runnbeck, eds., *What's Next? Strategic Views on Foreign Direct Investment* (Switzerland: UNCTAD, 2005), pp. 62-69.

[52] Greg Linden, "China Standard Time: A Study in Strategic Industrial Policy," *Business and Politics*, Volume 6, Issue 3, (2004), online cited 5 October 2007, available from <http://www.bepress.com/bap/vol6/iss3/art4>.

Figure 4
ICT R&D Percent Share in GDP by Country, 2002



Sources: OECD IT outlook 2006 and YCII2003
Note: China's R&D spending includes contributions from the FDI.

smaller share of ICT expenditure in terms of GDP (0.13 percent in 2002 including R&D spending of WFOEs and JVs) than other leading countries (figure 4). Although OECD data shows that China has a relatively larger pool of low-cost scientists and engineers, the world's fifth largest ahead of Germany, and behind France, Japan, Korea and the US, this should only be said to have technical potential.[53] Much of China's R&D activities seem to be directed toward basic technological learning and imitation; very few of them could be said to lead to truly competitive innovative products.[54]

Instead of concentrating on technological progress and specialization, Chinese enterprises tend to stay away from risky, costly R&D/skill investment and to diversify themselves by entering into other low-barrier sectors so as to continuously exploit a low-cost scale economy. For example, Haier expanded from home appliances to mobile phones, TCL and Panda from TV to mobile phones and PC, Lenovo from computers to printers and digital video/audio devices. Although this diversification supplier-upgrading approach allows Chinese enterprises to expand into a broader technology and product range and to capture some manufacturing activities, the former

[53] OECD, *IT Outlook*, 2006.
[54] Zedtwitz, *Connecting Science to Innovation*, 2007.

leading manufacturers have cut off such business, even whole chunks of their overseas production networks. Chinese firms' "walking-out" acquisition of other global leaders' mobile phone or TV and LCD businesses are all in manufacturing-intensive segments of particular value chains. For example, IBM sold off its PC unit to Lenovo in order to concentrate on its highly profitable and rapidly growing technology, "post-architectural" design and business service activities, all of which can enhance its competence in network controlling.[55] Similarly, Lenovo's closest US counterpart, Dell, has a very small proportion of manufacturing and assembly activities but is intensively focused on distribution network building.

Moreover, no matter how much progress Chinese firms like Lenovo can make to vertically expand product ranges, they still have to comply with industrial standards set by leaders, and incorporate their core components, such as "Intel Inside" and "Designed for Microsoft Windows," into Lenovo products. When new innovations such as pocket PCs become available, Chinese firms have to pay heftily again to take over these newer, standardized manufacturing activities shed from the leaders. The global expansion of Chinese ICT firms is thus better understood as China's response to the changing global competition, which is complementary to leading firms' specialization in higher-valued sectors and network-controlling activities.

China's strategies apparently have not been able to move domestic firms' activities away from non-differentiated commodity production toward the centre of today's competition, which would involve helping them to have branded and higher value-added products, to control and harness the potential of the GPNs and FDI to build up indigenous technological capability. This problem in fact has a root in the characteristics of China's nationalist industrial policies. As shown in section 2, China's "pillar" industrial strategies, largely influenced by political ideas of self-sufficiency, were designed on the assumption that a country can still create a particular industry from upstream to downstream and the whole supply chain within its territory. These strategies artificially forced the local vertical integration of industries and pushed activities, regardless of technological connectivity, under the roofs of a few large national group enterprises. The SME strategy was similarly launched in the hope of reducing dependence on foreign imports of key components and to support the "backbone" large enterprises by serving as their domestic supply chain.[56]

The state administratively intervened in the market to ensure the success

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[55] For example, prior to 2000, IBM's hardware business had the largest share of IBM's total income, but that dramatically declined to 34 percent by 2002. In the1992-2004 period, IBM service revenues were 45 percent of the total, increasing at 17 percent a year, and software revenues rose from 30 percent to over 50 percent. OECD, *IT Outlook*, 2004.

[56] Ning, "Economic Liberalization?" pp. 562-587.

of national industries without a clear picture of the dynamic development of the global ICT industry.[57] Globalization associated with the GPNs has led to a blurring of the national geographic boundaries of industries. Competitive suppliers today require global outsourcing capabilities to search worldwide for low-cost, high-quality parts and raw materials.[58] China's strategy also devoted much attention to manufacturing technologies, tangible assets and production and export volume. A huge over-supplied and low-skilled labour force was another factor that put pressure on Chinese leaders to concentrate on physical manufacturing activities in order to create employment opportunities.[59] This perhaps also results in the second step of "walking-out" being in the form of activities that seek out M&A or overseas R&D in order to enhance the companies' positions in the manufacturing-intensive segments of the global value chain.

While China's ICT exports grow at a rapid rate, the Chinese domestic market has expanded immensely given the dramatic increase in GDP, business and home use of ICT products, and increasing spending on ICT-related infrastructure. China is now the world's sixth-largest ICT market, at $118 billion in sales in 2005. It is also the world's largest mobile phone market, the second-largest PC market and the third-largest semiconductor market.[60] As section 3 shows, such fast-growing markets attract a large number of global firms to take more than 50 percent of the domestic market shares (table 3). Many Chinese firms are very busy fighting at home. They have very little incentive to leave such a strong growing market to "walk out" and conquer the markets of developing countries which are slow growing and require product adaptation, or of advanced countries, which have only a few niche markets available, involve high costs of market penetration, and entail huge competition from established global leaders.[61]

Last but not least, Chinese enterprises don't have the experience necessary to engage in the state-led "walking-out." An increasing number of overseas returnees may play an important role in improving China's corporate internationalization as they can transfer knowledge gained during their employment at leading MNCs. However, this effect will take time to build up. Chinese firms are relying heavily on global leading firms to develop management capabilities for both rapid domestic and international expansion. For example, Huawei is very dependent on IBM's consulting arm

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[57] Edward S. Steinfeld, "China's Shallow Integration: Networked Production and the New Challenges for Late Industrialization," *World Development*, vol. 32, no. 11 (2004), pp. 1971-1987.

[58] Sturgeon, "The New Global Supply-Base," pp. 35-88.

[59] George Gilboy, "Nodes without Roads: Pockets of Success, Networks of Failure in Chinese Industrial Technology Development" (PhD thesis, MIT 2003).

[60] OECD, *IT Outlook*, 2006.

[61] Zedtwitz "China Goes Abroad," pp. 62-69.

and Germany's Fraunhofer Gesellschaft to develop its integrated product development techniques and supply chain, and to improve R&D management and customer service.[62] Moreover, Chinese multinationals require additional operational experience to handle political opposition abroad resulting from their state-owned or related transitional characteristics. For instance, the US government restricted its use of Lenovo products in consideration of national security issues raised by uncertainty about the Chinese government's involvement in Lenovo.[63] Huawei faces US criticism over national security issues raised from its acquisition of 3Com, due to Huawei's past link with the Chinese military and business deals in the Middle East.[64]

Conclusion

This paper has argued that China's "attracting-in" and "walking-out" strategies have not made China the real leader of the global ICT industry. There is no denying the fact that "attracting-in" has successfully overcome unfavourable transitional economic and political conditions to initiate the industry. It has enabled domestic firms to improve capabilities by taking advantage of the emerging opportunities that result from transformations in the world ICT industry.

This paper took the position that China now faces a very different global and domestic economic and political environment, and a set of opportunities and challenges different from those experienced by EATs. China's policies have become inflexible and irrelevant in responding to the changing international competition. They still attempt to follow the old EAT development strategies in the hope of fulfilling a nationalistic sentiment: that of building a relatively independent national ICT industry with an entire industrial value chain and with a number of Chinese multinational enterprises all with their own components, brands, and cutting-edge technological capabilities. This policy focus is inconsistent with the emerging pattern of GPNs. The real result of these strategies, behind the industry's phenomenal growth and global expansion, has been obviously contrary to what Chinese policymakers intended.

Again, this paper does not wish to undermine China's great potential and capabilities. The strategies may not help domestic enterprises to be as innovative and powerful as leading flagships, but they do allow the companies to leverage great cost advantages to surpass other developing countries. A

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[62] Naughton and Ernst, "China's Emerging Industrial Economy," pp. 93-138.

[63] Steve Lohr, "State Department Yields on PCs From China," *The New York Times*, online cited 23 May 2006, <http://www.nytimes.com/2006/05/23/washington/23lenovo.html>.

[64] Bill Gertz, "Merger Opens U.S. Defense to China," *The Washington Times*, online, cited 3 October 2007, available from <http://www.washingtontimes.com/article/20071003/NATION/110030088/1002>.

time will come when Chinese firms find it expeditious to move towards the frontier of competition. However, in order to quickly reveal such potential, China needs to realize its ambitious nationalistic objectives and continuously reform its transitional economy. There are some areas in which the government still needs to play important roles. Future research on these might yield more detailed policy recommendations.

First, the government needs to realize that Chinese enterprises are not competing head-to-head with global leaders, but rather, they function to complement their global strategic restructuring. Neither the creation of "national champions" through forced vertical integration nor rushing domestic enterprises to "walk out" have been able to help them successfully develop the system integration capabilities that are needed to shape their position in the global ICT value stream. There is an assumption in these strategies that firms will all follow the same upgrading path and no consideration is given to their different historical paths, development stages, nature of production, and capabilities. Nationalistic sentiments could work as a non-economic motivation to promote industrial growth, but often lead to over-ambitious and irrational "forging-ahead" policies and understate the importance of global integration today. The industrial policies should enable firms to form more practical and suitable competition strategies by themselves, based on their own distinctive strengths and capabilities. These include: making decisions on partnerships and whether to outsource production, knowledge, skills and design, who they should compete with and in which markets, whether to compete through the original design or original equipment manufacturer route, or if they are ready to move to a higher tier in the global supply chain.

Second, no matter what upgrading route firms will undertake, they need a strong knowledge base and an encouraging and supporting environment. The WTO/ITA restrictions are only against "trade and investment-related" interventionist and protectionist policies; there is still small scope to use domestic policies, together with WTO non-actionable subsidies, to create learning effects, for example to assist firms to invest selectively in equipment or special skills, environment-related technological upgrading, and R&D conducted by domestic firms and international research institutes. There should also be support for backing start-up firms and innovation pioneers, and assisting less developed regions to set up industrial parks. The government can also encourage global inward movement of human resources with more innovative immigration policies. Furthermore, the WTO/ITA rules may prevent the government from squeezing particular technology concessions out of FEIs as a condition for market access. Global leaders can determine the type and flow of "knowledge mobility." The government however can still increase the possibility of such mobility. This requires significant improvements in China's transitional economic environment: market orientation, macroeconomic stabilities, transparent capital markets, rule of

law, human and physical infrastructure, etc.

Third, the above suggestions are based on the assumption that firms are privately owned. This is not something the government considered when emulating the conventional EAT-style strategies. Privatization could provide an alternative solution to reducing foreign political opposition over national security issues against Chinese enterprises' "walking-out." However, the critical question is whether significant privatization is feasible within China's transitional "socialist" political structure, and also given the dual-use nature of the ICT industry. One option for the government perhaps is to reconsider the functions of SOEs in the technological learning process during further market reform. As opposed to private firms, SOEs are established for purposes other than making a profit. These mainly include reducing distributional problems in some regions, to achieve some macroeconomic goals (such as bringing down inflation) and to promote private firms.[65] It is therefore not justifiable to use profitability or the concept of competitiveness to measure SOEs' performance. In Taiwan's case, SOEs are created as the first move into new markets, where small private firms have both financial and technological difficulties. SOEs in these selected sectors could stimulate initial demand, create spill-over effects, diffuse knowledge and broaden the technology base of private firms. Apart from this, Chinese SOEs could be used to address distributional concerns of economic activities among provinces. The government could assist firms from coastal areas to shift their less productive activities to less developed regions so as to foster their own production supporting bases.

Cambridge University, United Kingdom, February 2008

[65] Raymond Vernon, "Introduction," in Raymond Vernon and Yair Aharoni, eds., *SOEs in the Western Economies* (New York: St. Martin's Press, 1981), pp. 7-22.